REMARKS

This Amendment is fully responsive to the non-final Office Action dated February 18, 2009, issued in connection with the above-identified application. Claims 1-35 are pending in the present application. With this Amendment, claims 1, 13, 14, 26, 27, 29 and 30 have been amended. No new matter has been introduced by the amendments made to the claims. Favorable reconsideration is respectfully requested.

In the Office Action, claims 26-29 and 34 have been rejected under 35 U.S.C. 101 for allegedly failing to fall within one of the four enumerated statutory classes of patentable subject matter based on a recent Supreme Court precedent. See *In re Bilski,* 88, USPQ 1385 (Fed. Cir. 2008). Specifically, the Examiner indicates that the process recited in the claims must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing.

With regard to independent claims 26 and 27, the claims have been amended to include the structure that performs the steps recited in the claims, thereby tying the process or method covered by the claims to a particular apparatus. Claim 28 depends from independent claim 27 (now amended). As amended, claims 26-28 are directed to a statutory process or method within the meaning of 35 U.S.C. 101.

With regard to claim 29, the Applicants respectfully point out the claim is directed to a program, not a process or method. And, the recent Supreme Court precedent cited by the Examiner (i.e., *In re Bilski*) is directed to determining whether a process or method is statutory, not a program. However, claim 29 has been amended to point out that the program recited in the claim is stored on a "computer-readable storage medium," which is clearly statutory (see MPEP 2106.01). Given that independent claim 30 is also directed to a program, the same amendments were made to that claim as well. As amended, claims 29 and 30 are now directed to a statutory program within the meaning of 35 U.S.C. 101.

In the Office Action, claims 1-5, 7, 9, 13-18, 22 and 26-35 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Rigazio et al. (U.S. Patent No. 6,182,039, hereafter "Rigazio") in view of Deligne et al. (U.S. Patent No. 6,314,399, hereafter "Deligne"), and further in view of Millett et al. (U.S. Patent No. 6,584,458, hereafter "Millett). The Applicants have

amended independent claims 1, 13, 14, 26, 27, 29 and 30 to help further distinguish the present invention from the cited prior art. For example, independent claim 1 (as amended) recites the following features:

"[a] language model generation and accumulation apparatus that generates and accumulates language models for speech recognition, the apparatus comprising:

a higher-level N-gram language model generation and accumulation unit operable to generate and accumulate a higher-lever N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting (i) two or more words and (ii) at least one word included in the plurality of texts except for the words included in the word string class; and

a lower-level N-gram language model generation and accumulation unit operable to generate and accumulate a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string class,

wherein the word string class further includes a virtual word denoting a beginning of the word string class and a virtual word denoting an end of the word string class,

the higher-level N-gram language model is an N-gram language model for calculating a link between the words or a word that can be broken down into a plurality of words,

the lower-level N-gram language model is an N-gram language model for calculating a link between the words included in the word that can be broken down into the plurality of words,

in the speech recognition,

an alignment of words is recognized from an input speech, by referring to a recognition dictionary which describes pronunciation of the words,

a sequence of words including the word string class is assumed in the alignment of words, and

the input speech is recognized based on (i) a probability that the words including the word string class appears in an order of appearance in the assumed sequence of words and (ii) a probability of an appearance of the words or the virtual word denoting the end of the word string class in an order of appearance in the word string class."

The features noted above in independent claim 1 are similarly recited in independent

claims 13, 14, 26, 27, 29 and 30, as amended. Additionally, the features noted above in independent claim 1 (and similarly recited in independent claims 13, 14, 26, 27, 29 and 30) are fully supported by the Applicants' disclosure.

In the Office Action, the Examiner relies on the combination of Rigazio, Deligne and Millet for disclosing or suggesting all the features recited in independent claims 1, 13, 14, 26, 27, 29 and 30. However, the Applicants assert that the combination of Rigazio, Deligne and Millet fails to disclose or suggest the features now recited in independent claims 1, 13, 14, 26, 27, 29 and 30, as amended.

Rigazio discloses or suggests improving the recognition performance by introducing constraints of the N-gram probability into sequences of phonetic units. For example, when recognizing a word "Tony," the word is recognized while not only taking the acoustic similarity of "Tony" into consideration, but also the probability (N-gram) between the letters "t-o-n-y."

Rigazio further discloses the classes of letters, each of which includes a set of letters that share similar properties with regard to occurrence (see e.g., the confusable sets in col. 6 showing the details on the classes). Thus, Rigazio emphasizes the effects achieved by using the transition probability between the classes (i.e., class N-gram).

In the Office Action, the Examiner asserts that the confusable set disclosed in Rigazio is the lower-level N-gram because the N-gram model is applied to a unit smaller than a word. However, in Rigazio, the unit of the lower-level N-gram is "a unit smaller than a word," which is an important difference between Rigazio and the present invention.

More specifically, in the present invention, a word is used as a unit even in the "lower-level N-gram." If the "lower-level N-gram" in Rigazio is used for recognizing a title such as "Red Cliff," for example, the sequence is modeled as "r-e-d-c-l-i-f-f."

On the other hand, in the present invention, the sequence of the words is modeled, such as "red-cliff," and thus the constraints of the model are stronger than

the model in Rigazio. It is likely that the Examiner determined the lower-level N-gram model based on the length of the unit element (i.e., based on the difference of whether it is a letter, a word, or a collocation). In the present invention, although the unit element is a word, the higher-level and the lower-level are determined based on whether the words are a sequence function like a word or not. More specifically, the present invention focuses on, in the sentence "I watch "Red Cliff," if the sequence "Red Cliff," which is a sequence of words, functions like a word in a sentence "I watch X."

Deligne discloses a method in which a sentence (a word string) is divided into partial word strings, and the sequence between the partial word strings is modeled by N-gram. Deligne is directed to finding the best way to divide optimal partial word strings and the best way to calculate the N-gram. Although the process in Deligne considers a part of the N-gram as a higher level N-gram, there are still clear differences between the present invention (as recited in independent claims 1, 13, 14, 26, 27, 29 and 30) and Deligne. In particular, Deligne considers the partial word strings as "lower-level."

Specifically, in Deligne, the partial word string is merely determined by a statistical standard, and is not a group of words having a specific meaning in a sentence, such as a title of a program.

Conversely, the present invention (as recited in independent claims 1, 13, 14, 26, 27, 29 and 30) models a word string as a title so as to recognize the title even when, for example, the title "Red Cliff" appears only once in training data. On the other hand, the title would not even be grouped into a partial word string according to the method in Deligne.

Additionally, in the method disclosed in Deligne, it is necessary to store the partial word strings in some way. For example, the partial word strings are stored in Sequence Memory 36 and in Sequence Bi-multigram Probability Memory 32 (see e.g., in Fig. 1). However, it is an object of the present invention (as recited in independent claims 1, 13, 14, 26, 27, 29 and 30) to solve this problem (related to the limit) when storing all of the existing titles in such a manner. For example, in the present invention, the title "Red Cliff" is not stored in a memory. The present invention achieves the calculation for sequence probability of "Red Cliff" by storing the

general words "red" and "cliff," and by storing the lower-level N-gram model for calculating the sequence possibility between the words.

As described above, Rigazio and Deligne fail to disclose or suggest at least all the features of the lower-level N-gram of the present invention (as recited in independent claims 1, 13, 14, 26, 27, 29 and 30). Additionally, after a detailed review of Millet, the reference fails to overcome the deficiencies noted above in Rigazio and Deligne.

Accordingly, no combination of Rigazio, Deligne and Millet would result in, or otherwise render obvious, independent claims 1, 13, 14, 26, 27, 29 and 30 (as amended). Moreover, no combination of Rigazio, Deligne and Millet would result in, or otherwise render obvious, claims 2-5, 7, 9, 15-18, 22 and 28 and 31-35 at least by virtue of their respective dependencies from independent claims 1, 13, 14, 27 and 30.

In the Office Action, claims 6, 8, 10-12, 19-21 and 23-25 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Rigazio in view of Deligne and Millett, and further in view of Hwang et al. (U.S. Publication No. 2002/0082831).

Claims 6, 8 and 10-12 depend from independent claim 1; and claims 19-21 and 23-25 depend from independent claim 14. As noted above, Rigazio, Deligne and Millet fail to disclose or suggest all the features now recited in independent claims 1 and 14. Additionally, Hwang fails to overcome the deficiencies noted above in Rigazio, Deligne and Millet. Accordingly, no combination of Rigazio, Deligne, Millet and Hwang would result in, or otherwise render obvious, claims 6, 8 and 10-12 at least by virtue of their respective dependencies from independent claims 1 and 14.

In light of the above, the Applicants respectfully submit that all the pending claims are patentable over the prior art of record. The Applicants respectfully request that the Examiner withdraw the rejections presented in the outstanding Office Action, and pass this application to issue.

The Examiner is invited to contact the undersigned attorney by telephone to resolve any remaining issues.

Respectfully submitted,

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